



Minnesota Population Center

UNIVERSITY OF MINNESOTA

**Using the Annual Social and Economic Supplement
with Current Population Survey Panels**

Sarah Flood†
Minnesota Population Center
University of Minnesota

José Pacas
U.S. Census Bureau
Washington, DC

September 2016

Working Paper No. 2016-4

†Correspondence should be directed to:

Sarah Flood

University of Minnesota, 50 Willey Hall, 225 19th Ave S., Minneapolis, MN 55455

e-mail: floo0017@umn.edu , phone: 612-624-5818, fax:612-626-8375

Abstract

The Annual Social and Economic Supplement (ASEC) is the most widely used type of Current Population Survey (CPS) data because of its rich information on employment, unions, health insurance and taxes. Researchers typically use these data as repeated cross sections despite the longitudinal component of the CPS, which many researchers are unaware of and very few leverage. The IPUMS-CPS (<https://cps.ipums.org>) project at the University of Minnesota is undergoing a large-scale effort to unlock the enormous research potential of the CPS by making it easier to access and use monthly CPS data and to link observations over time. Making the ASEC available to the research community as part of the larger collection of linked CPS panel data is of enormous value given the widespread use of the ASEC. But the unique aspects of the ASEC compared to other Basic Monthly CPS files make it cumbersome to use it as part of a longitudinal CPS panel. This paper details the complexities of the ASEC oversampling and the creation of an identifier that links the ASEC and the March Basic Monthly data which drastically simplifies analyzing ASEC data as part of a panel of CPS observations.

Keywords: Data integration, linking, panel data, Current Population Survey

Section 1 – Introduction

The Annual Social and Economic Supplement (ASEC) is the most commonly used file from the Current Population Survey (CPS) with its rich information about employment, union membership, health insurance and taxes. While the monthly CPS, referred to henceforth as the Basic Monthly CPS, is the official source of labor force statistics of the United States, the ASEC gathers data on social and economic indicators. These data are used to calculate the official poverty rate of the United States and have been used to measure health insurance coverage rates in the post-Affordable Care Act period. The breadth of data collected in the ASEC means it is among the most popular datasets for analyzing the United States population and it is arguably the most popular CPS supplement.

Despite its longitudinal component, researchers typically use these data as repeated cross sections because of the effort required to correctly link the data across years. Researchers have documented the difficulties of and strategies for linking CPS monthly data as well as how to link adjacent ASEC samples [1, 2, 3, 4, 5, 6]. No paper, however, has addressed how to use ASEC data in conjunction with Basic Monthly CPS data.

IPUMS-CPS (<https://cps.ipums.org>) is eliminating barriers for researchers who want to use linked CPS data. Building on previous work to enhance access to the ASEC, IPUMS-CPS is also simplifying access to Basic Monthly CPS data and facilitating the linking of CPS observations over time via the creation of a new unique identifier (CPSID) [7]. Unfortunately, due to the unique aspects of the ASEC compared to the other Basic Monthly CPS data, the power of CPSID is limited by the exclusion of the ASEC. This paper documents the creation of an additional identifier (MARBASECID) that makes the linkage between the ASEC and the March Basic Monthly CPS data straightforward and simplifies analyzing ASEC data as part of a panel of CPS observations. Making the ASEC available as part of the larger collection of linked CPS panel data is of enormous value given the widespread use of the ASEC and underutilization of linked CPS data. This effort promises to save the research community countless

hours of duplicated effort, eliminates a huge potential source of error, and increases replicability of research results.

We begin with an overview of the CPS and a description of the ASEC oversamples. The CPS overview details differences between the ASEC and other months of CPS data and the implications of oversample changes for users who want to link ASEC observations both to other ASEC files and to Basic Monthly CPS files. We then detail the process we followed to create MARBASECID, which allows us to easily link ASEC and March Basic Monthly CPS data, add CPSID to ASEC files, and drastically simplify researcher use of ASEC data along with other Basic Monthly CPS data as a panel. Finally, we also provide substantive examples to illustrate the value in combining the ASEC with other Basic Monthly CPS data.

Section 2 – Brief Overview of the Current Population Survey

To link respondents from the ASEC to Basic Monthly CPS data, one must understand the purpose and design of the CPS. The primary function of the CPS is to be "the source of the official Government statistics on employment and unemployment" [7]. These data have been collected on a monthly basis since 1940 when record levels of unemployment during the Great Depression heightened the need for reliable unemployment statistics. To that point there had been little effort to count the number of jobless persons in the country, much less to develop precise definitions and concepts of employment. During the late 1930s, these concepts were developed and adopted for a national survey of households implemented by the Works Progress Administration. This effort resulted in the first iteration of the Monthly Report of Unemployment, introduced in 1940. In 1942, the Census Bureau took over the survey and changed the name to the Monthly Report on the Labor Force. In 1948, a final name change occurred to the CPS "to reflect the survey's expanding role as a source for data on a wide variety of demographic, social, and economic characteristics of the population" [8]. A final significant event in the history of the survey is that, in 1959, the task of analyzing and publishing CPS labor force data was given to the Bureau of Labor

Statistics while the Census Bureau maintained the task of data collection. In short, the CPS has historically been and continues to be a monthly labor force survey [8].

The Basic Monthly CPS is a sample representative of the civilian, household-based population of the United States. The CPS samples households¹ (physical structures) and surveys their occupants. Once a household is selected into the sample, household members are surveyed in four consecutive months, left out of the sample for the following eight months, and then re-interviewed in each of the following four months; the rotation pattern is illustrated in Table 1. CPS refers to each interview month as a Month-in-Sample (MIS) and thus there are at most eight MIS for a particular household (MIS 1- MIS 8). For example, consider a dwelling that is selected for the survey in January of 2001. The individuals in the dwelling will be interviewed in January 2001, February 2001, March 2001, and April 2001. For the following eight months (May 2001-December 2001), they will not be interviewed. The individuals in the dwelling will be interviewed four more times: January 2002, February 2002, March 2002, and a final interview in April 2002.

[Table 1 about here]

Section 2a – CPS Supplements

In addition to the Basic Monthly CPS, supplements to the CPS are frequently fielded. CPS supplements vary widely in scope and type (see Table 11-1 from [8] for a complete list of CPS supplements) and usually contain only individuals who also complete the Basic Monthly Survey in the

¹ A household consists of all the people who occupy a housing unit. A house, an apartment or other group of rooms, or a single room, is regarded as a housing unit when it is occupied or intended for occupancy as separate living quarters; that is, when the occupants do not live with any other persons in the structure and there is direct access from the outside or through a common hall. A household includes the related family members and all the unrelated people, if any, such as lodgers, foster children, wards, or employees who share the housing unit. A person living alone in a housing unit, or a group of unrelated people sharing a housing unit such as partners or roomers, is also counted as a household. The count of households excludes group quarters. (<http://www.census.gov/cps/about/cpsdef.html>)

month the supplement is fielded.² For example, the Voting and Registration supplement is fielded biennially and administered only to respondents from the November Basic Monthly CPS. Supplement eligibility (i.e. universes) varies, however, meaning that some respondents to a Basic Monthly CPS will not receive the supplemental questionnaire fielded in that month. For example, the Displaced Worker supplement is asked of workers 20 years of age and older who were displaced from their jobs and who were interviewed in the January Basic Monthly CPS. The ASEC is an exception; this supplement is administered during the March Basic Monthly CPS, but also includes CPS participants from other months who are not scheduled to receive the March Basic Monthly CPS. This unique aspect of the ASEC requires special handling in the process of linking it to other CPS data files.

Section 2b – The "March Supplement"

The most popular CPS supplement is the "March Supplement." The technical name for this supplement since 2003 is the Annual Social and Economic Supplement (ASEC) or the Annual Demographic File (ADF) between 1947 and 2003. The ASEC was first introduced in 1947. Between 1947 and 1955, the ASEC was administered in April and included households from the April Basic Monthly CPS (see Table 2). After 1955, the ASEC was implemented in March, and began being commonly referred to as the "March Supplement." Between 1956 and 1975, the ASEC consisted only of respondents from the March Basic Monthly CPS. Over time, the ASEC sample has expanded to improve the reliability of information about certain subpopulations (i.e. persons of Spanish (Hispanic) origin and low-income children who do not have health insurance coverage). Currently, the ASEC contains basic monthly demographic and labor force data as well as supplementary data on work experience, income, noncash benefits, and migration [7]. Given the expansion and implementation of the ASEC – drawing the ASEC

² There are three exceptions to the Basic Monthly CPS serving as the sampling scheme for CPS supplements. The Housing Vacancy Supplement (HVS) and the American Time Use Survey (ATUS) are surveys that base their samples from the Basic Monthly CPS but do not happen at the time of the Basic Monthly CPS. The HVS collects information on housing units that were vacant at the time of the Basic Monthly CPS. The ATUS collects information on how respondents spend their time and is conducted a few months after a respondent's final Basic Monthly CPS survey. The third is the ASEC described in detail here.

sample from the March Basic Monthly CPS and households from non-March Basic Monthly CPS samples – there are complications for longitudinal linking of Basic Monthly CPS files [8].

[Table 2 about here]

Section 2c – ASEC Oversamples

The ASEC oversampling scheme has important ramifications for researchers who want to link CPS respondents across time. Though all of the ASEC respondents participate in the Basic Monthly CPS, only ASEC households that were administered the March Basic Monthly CPS can be matched. Linking ASEC oversample respondents to their Basic Monthly CPS observations is extremely tedious and labor intensive at best, if not impossible in some cases. We therefore focus our efforts on matching March Basic Monthly CPS observations to records in the ASEC (see Table 3). Figure 1 graphs the size of the ASEC oversample from 1989 to 2013 and shows that in each year the ASEC is larger than the March Basic Monthly CPS with larger differences when the SCHIP (State Children’s Health Insurance Program) oversample is introduced (details on this below). MARBASECID is currently created for the 1989 to 2013 period, but will be created forward (up to the most current ASEC) and backward (up to ASEC 1976) in time so that CPSID can be made available via IPUMS-CPS.

From March 1976 through 2000 the Census Bureau increased the reliability of estimates for people of "Spanish origin" by conducting additional interviews with November households (from the previous year) that contain one or more persons of Spanish origin [9]. The ASEC oversample of people of Spanish origin is commonly referred to as the "November Hispanic oversample." The November Hispanic oversample increased the size of the ASEC by about 2,500 additional households (see the 1989-2000 range in Figure 1). Because of the CPS rotation pattern (4-8-4), all of the Spanish households identified in November are out of the CPS sample when the March Basic Monthly CPS is conducted (in fact, no households interviewed in November are eligible for the March interview based on the 4-8-4 CPS rotation pattern). For example, a household in MIS 1 in November will be MIS 4 in February and thus out of the

CPS in March (similarly, MIS 5 households in November will be MIS 8 in February). Because the oversample households would not have otherwise been in the ASEC, we refer to these extra visits as MIS 9 and 10, respectively; in the data, however, the Hispanic oversample cases are assigned MIS values between one and eight, making the oversample cases more complicated to identify.³ During the extra interviews, the November Hispanic oversample receives both the March Basic Monthly CPS and the ASEC, though the responses to the Basic Monthly are never released [8]. Thus, the November Hispanic oversample results in additional cases in the ASEC from other months of the CPS that would not have otherwise been in the March Basic Monthly CPS.

The second CPS sample expansion in 2001 was funded by a Congressional allocation of \$10 million annually to the Census Bureau. The expansion was motivated by an interest in producing reliable state-level estimates on low-income children without health insurance and to measure the effects of the State Children's Health Insurance Program (SCHIP) established by Congress in 1997 [10]. This initiative funded a general expansion of the CPS as well as an additional oversample to the ASEC. The general expansion added 12,000 units to the sample monthly [10]. The Basic Monthly CPS sample size increases were completed between September 2000 and July 2001 as is evident by the increasing sample sizes during this period in Figure 1. While the sample increases were completed in July 2001, the expansion is not evident in the March Basic Monthly CPS until 2002 [10].

[Figure 1 about here]

In contrast to the November Hispanic oversample, the SCHIP oversample is drawn using two strategies: "split-path" assignment and month-in-sample 9 (MIS 9) assignment. The "split-path" strategy selects respondents from the February Basic Monthly CPS and April Basic Monthly CPS (adjacent months to the March Basic Monthly CPS). February households with MIS 4 and 8 that contain children

³ In the ASEC files, all households receive an MIS value of 1-8. In Census documentation, extra interviews are occasionally referred to as MIS 9. For convenience, we refer to the second additional interview for oversample cases as MIS 10.

(18 or younger) or non-White household members complete the ASEC at the time of the February Basic Monthly CPS interview. Similarly, April households in MIS 1 and 5 that included children (18 or younger) or non-White household members receive the ASEC during the April CPS Basic interview. Neither the “split-path” eligible respondents from February or April would have otherwise participated in the ASEC because of the survey’s rotation pattern. The term "split-path" thus refers to these February and April cases that would normally have received the supplements assigned for February and April (potentially Job Tenure or Child Support) but instead are "split" into the ASEC. Theoretically, one should be able to identify ASEC respondents selected as part of this split-path assignment [10].

The second set of households in the SCHIP oversample – the MIS 9 households – is administered an extra interview.⁴ These cases are contacted for a ninth interview in either February or April. From 2001 to 2003, these households are drawn from the November Basic Monthly CPS of the previous year if they are in MIS 6, 7, or 8 in November *and* they are not part of the November Hispanic oversample *and* they are not Hispanic *and* either have at least one child 18 years or younger or a non-White member. Note that these households will have completed all eight interviews of the CPS rotation pattern by January at the latest (for MIS 6). Starting in 2004, the MIS 9 oversample was chosen from August (MIS 8), September (MIS 8) and October (MIS 8); the same condition applies as before of either having at least one child 18 years or younger or a non-White member and being non-Hispanic [10].

Section 3 – IPUMS-CPS Constructed Identifiers for Linking CPS Data

⁴ Notice that the November Hispanic oversample respondents are also contacted an extra time outside of their 8 scheduled CPS Basic interviews. In fact, since the November Hispanic oversample includes households from all MIS's, it is possible that a household from the November Hispanic oversample is contacted two extra times. Thus, though the common understanding of the CPS rotation pattern implies that households are interviewed at most 8 times is technically incorrect. As part of the ASEC oversampling, it is possible for Hispanic oversample households to be contacted 10 separate times and MIS-9 oversample households to be contacted 9 times. Unfortunately, MIS values in the public use data do not exceed 8.

IPUMS-CPS has created two identifiers for linking CPS data. CPSID uniquely identifies each individual in the CPS and is used to linking Basic Monthly CPS files to one another. MARBASECID is used to identify individuals in both the March Basic Monthly CPS and in the ASEC and allows IPUMS-CPS to put CPSID on the ASEC files. Our creation of two identifiers serves two purposes. First, it is an opportunity to encourage researchers to be deliberate about their use of the ASEC data with Basic Monthly CPS data and to more thoroughly understand CPS survey design details. Second, MARBASECID allows us to be transparent about the assignment of CPSID to ASEC records, an effort that was parallel to but not the same as that to create CPSID.

Section 3a – CPSID

The ASEC is unique among CPS data and that has implications for linking, which we describe in the next section. To lay the foundation for our work on MARBASECID, we first outline the procedures for linking CPS Basic Monthly data. Using linking keys available on all public use Basic Monthly CPS files, users can link observations over time to create short sixteen-month panels with up to eight observations per person. This work, however, is cumbersome and expensive for each individual researcher to perform independently. The several obstacles researchers face in linking Basic Monthly CPS observations, including recycled identifiers, changing linking keys, and the household rather than the person as a sampling unit, are detailed elsewhere [6]. As a service to users, IPUMS-CPS staff created a single unique identifier – CPSID – that lowers the barrier to using repeated observations of individuals from Basic Monthly CPS files as a panel. CPSID uses the original linking keys provided by CPS to match records over time, accounts for the complex CPS rotation pattern, and assigns a new unique identifier to each record in the Basic Monthly CPS. However, CPSID was not initially created for ASEC files because the ASEC lacks all of the linking keys required for matching records to other Basic Monthly CPS files.

Section 3b – MARBASECID

To make CPSID available on the ASEC, we create MARBASECID, a variable we use and make available to users to match individuals in the ASEC to the March Basic Monthly CPS. MARBASECID is a 10-digit variable that links individuals in the March Basic Monthly CPS of year X (1989-2013) to the ASEC in the same year. Each person in both the March Basic Monthly CPS and the ASEC in a given year are assigned a unique ID that consists of two digits (either 00 or 11), a two-digit year, and a six-digit sequence number. For individuals who appear in both the March Basic Monthly CPS and the ASEC, the two-digit number that becomes the first two digits in MARBASECID is 11; the six-digit sequence number begins at 000001 and increments by one for each additional person in the file who also matches. For a matched observation in the 1989 March Basic Monthly CPS, MARBASECID is 11 + 89 + six-digit sequence number. The two-digit number for unlinked observations in both the March Basic Monthly CPS and the ASEC is 00. For unlinked March Basic Monthly CPS individuals, MARBASECID takes the form: 00 + two-digit year + six-digit sequence number starting at 000001 and incrementing by one for each unlinked March Basic Monthly CPS person. For unlinked ASEC individuals, MARBASECID is a concatenation of 00, two-digit year, and a six-digit number starting at 500,000 and incrementing by one for each unlinked ASEC observation. This method ensures that MARBASECID is unique within and across years. For example, a MARBASECID value of 1100012345 is decoded as follows: “11” refers to the individual who is in both the March Basic and ASEC; “00” refers to the ASEC survey year of 2000; “012345” refers to that household being given the randomly sequenced order number of 12345. Similarly, a MARBASECID of 0098000012 refers to an unlinked person from the March Basic of 1998 while 0098500012 refers to an unlinked person from the 1998 ASEC.

Section 3c – Creating MARBASECID

We now turn to the technical details for creating MARBASECID, the identifier for linking the March Basic Monthly CPS and the ASEC. The creation of MARBASECID is a critical step in the process of attaching CPSID, a unique IPUMS-created identifier, to the ASEC. As discussed previously, CPSID allows researchers to may easily and reliably link data across CPS months, including the ASEC. The

creation of MARBASECID eliminates the need for individual researchers to perform this tedious and cumbersome process of linking the March Basic Monthly Survey and the ASEC, which is complicated for two primary reasons. First, the variables required to link the ASEC to CPS monthly files are not available for all years on the ASEC. As a result of omitted linking keys and the ASEC oversample, duplicate and false matches are problematic. Second, we speculate, despite the absence of technical documentation to be certain, that the Census Bureau transition to a computer-based interview resulted in more prominent data quality issues for linking across months even if they did not compromise the integrity of each individual month of data.

The March Basic Monthly CPS to ASEC matching algorithm overcomes these difficulties and allows us to put CPSID on the ASEC for easy linkages to other CPS monthly data. With CPSID on the ASEC, opportunities for using the CPS as a panel multiply since the ASEC is the premier CPS supplement. Theoretically, Census-provided household and person identifiers should be sufficient to link the March Basic Monthly CPS and ASEC files. If that were the case, researchers would have many demographic variables with which to check the validity of matches. Practically, however, the linking keys that should uniquely identify records do not always [2]. Table 3 details by year (1989-2013) the variables used to link the March Basic Monthly CPS and ASEC, the number of persons in the March Basic Monthly CPS, the number of matches/non-matches to the ASEC, and the number of invalidated matches. From 1994 forward, we validate matches based on AGE, SEX, and RACE (we follow the evaluation of validity using age, sex and race in line with [1]), and we find high validation rates for links made between the March Basic Monthly CPS and ASEC files.

Our strategy for creating MARBASECID is slightly different depending on the types of problems we encounter linking the March Basic Monthly CPS and ASEC files. From 2005 to 2013, the matching algorithm is very simple. Using the variables listed in Table 3, one is able to uniquely identify all March Basic Monthly CPS respondents and ASEC respondents and March Basic Monthly CPS observations are easily located in the ASEC.

[Table 3 about here]

From 1996 to 2004, the matching algorithm is more complicated because of duplicate records caused by non-unique linking keys. Our strategy for handling the duplicate records is as follows. During the first stage, duplicate records based on the first stage linking keys in Table 3 are identified and flagged in both the March Basic Monthly CPS and the ASEC. Then, March Basic Monthly CPS records that are not uniquely identified are dropped from the file. Within a pair of ASEC duplicates, we keep the duplicate with the lowest H_SEQ (the household identifier created by Census Bureau that is unique within a given survey month) value since these records are part of the March Basic Monthly CPS rather than an ASEC oversample [11]. We then merge the pruned March Basic Monthly CPS and ASEC files using the first stage linking keys in Table 3. The second stage of work uses the observations from the duplicate record file (i.e. the “pruned” observations) and the non-matches from the first round of matching. We link records using the fewest variables possible. Even then, the data sometimes require a close analysis of a few observations in order to find the correct match. The period 2001 to 2004 was potentially problematic because of the SCHIP expansion of the ASEC oversample. Though CPS documentation details the variables researchers should use for linking, these variables do not uniquely identify records, thus complicating the process. The 1996 to 2000 period was also problematic for unknown reasons. These complications are detailed in Appendix A.

The greatest challenges in creating MARBASECID occur prior to 1996 when data quality problems (i.e. duplicate records based on linking keys and missing observations) are more common. In 1995, we employed the two-stage matching approach and were unable to match 951 observations from the March Basic Monthly CPS to the ASEC. It is possible that the observations are missing from the ASEC, though we have yet to find documentation about this specific issue. To link the 1994 March Basic Monthly CPS and ASEC files, we employ first and second stage matching (Table 3) and also make additional adjustments. The most important adjustment is that the ASEC file must contain a corrected version of HRHHID (the originally released 1994 ASEC file contained an error in HRHHID resulting

from the program that created the variable [12]; a corrected file was made available via NBER in 2003 and is available via IPUMS-CPS); matching is impossible without the corrected version of HRHHID. Several other minor adjustments must be made, including harmonizing age for a few observations (i.e. an observation may have age of 81 in the March Basic Monthly CPS but 80+ in the ASEC) and handling duplicate observations; our handling of these issues is detailed in Appendix B.⁵

Section 4 – Linking Research Potential

The ability to easily link CPS observations over time to the ASEC creates opportunities for many lines of research that have previously been limited without deep knowledge of the ASEC and the CPS more generally. The ASEC is especially important for researchers who want to leverage information about taxes, health insurance, public benefit use, among other things because these data are not collected in the CPS outside of the ASEC. Below, we provide two substantive examples of linking CPS Basic Monthly data to the ASEC that demonstrate the potential of MARBASECID for the research community.

Because of the CPS rotation pattern, in which each household appears in the CPS up to eight times denoted by their month in sample (MIS) value, one can link individuals who participate in the March Basic Monthly CPS and the ASEC to up to three months prior (December, January, February) and up to three months after (April, May, June) (see Table 1).⁶ In theory 25% of the December/June Basic Monthly CPS will link to March (respondents in MIS 1, 5 for December of the previous year, respondents in MIS 4, 8 for June of the current year); 50% of the January/May Basic Monthly CPS will link to March (respondents in MIS 1, 2, 5, 6 for January of the current year, respondents in MIS 3, 4, 7, 8 for May of the current year); 75% of the February/April Basic Monthly CPS will link to March (respondents in MIS 1, 2, 3, 5, 6, 7 for February of the current year, respondents in MIS 2, 3, 4, 6, 7, 8 for April of the current year).

⁵ Prior to 1994, Census released very few variables for linking surveys. Despite trying to avoid matching March Basic Monthly CPS and ASEC observations on AGE, SEX, and RACE, we used these variables to uniquely identify and match records between 1989 and 1993.

⁶ We do not consider oversample cases here because we have been unable to locate documentation for linking oversample members to their respective Basic Monthly CPS observations.

In practice, however, mobility, mortality, births, and non-response are major issues for the CPS, resulting in actual linkage rates that are lower than possible linkage rates.

Appendix C shows the actual number of linkages between December of year x to June of year $x+1$ to the ASEC in year $x+1$ for all years between 1989 and 2013. Linkage rates to the ASEC are consistently high; as expected, we also see that that the months furthest from March (December, June) have the lowest percentage of actual links (around 90% of the potential links) while the months adjacent to March (February, April) have the highest percentages (most commonly around 95%).^[6] The percentage of links for April, May and June of 2001 are substantially lower than in other years (see Appendix C). Note also that there are no links between the ASEC and the June Basic Monthly CPS in 1995; this is because the Census Bureau scrambled household identifiers to protect respondent confidentiality due to changes in geography, making it impossible to use linking keys to match June, July and August 1995 to surrounding months. This results in three different time frames for making individual linkages over time: 1) May 1995 and prior, 2) June, July, and August 1995, 3) September 1995 forward. As a result, June 1995 respondents are not linkable to the March 1995 sample [12].

Section 4a – Substantive Example #1: Child Tax Credit Receipt and Food Security

The link between food insecurity and low income in the United States has been widely documented [13]. Using the CPS, a researcher could examine the relationship between receiving the Child Tax Credit (CTC) and food security. The CTC reduces the amount of taxes families pay (depending on adjusted gross income) by \$1,000 dollars per qualifying child. This tax credit increases the disposable annual income of low-income families, potentially reducing their food insecurity.

Answering this question using CPS requires linking ASEC and December Food Security files since tax credit questions are only asked in the ASEC and food security is only assessed in the Food Security Supplement. For illustration purposes, we link the 2005, 2006, 2007, and 2008 Food Security Supplement respondents (from December) to their ASEC records in the following year (2006-2009). We

use CPSID to link the Food Security Supplement to the March Basic Monthly CPS and MARBASECID to link March Basic Monthly CPS and ASEC observations (see Table 4). Only one quarter of December Basic Monthly CPS respondents (those in MIS1 and 5) are eligible to be linked to the March Basic Monthly CPS using CPSID (see Column 3 of Table 4). We match 90% of eligible observations between the December and March Basic Monthly surveys (or 22% of the entire December Basic Monthly CPS sample [see Table 4, Column 5]). The linkage rates are consistent with other observations four months apart [6].

[Table 4 about here]

After linking December and March Basic Monthly CPS observations using CPSID, we use MARBASECID to link to the March Basic Monthly CPS to the ASEC. The March Basic Monthly CPS to ASEC linkage is perfect, but the number of records with both food security and tax responses is slightly lower because the CTC variable is only available for persons 15 and older (Table 4, Column 7). The final linked and eligible sample is about 15% of the December Basic Monthly CPS (Table 4, Column 8) and about 62% of the total MIS 1 and 5 observations from the December Basic Monthly CPS (Table 4, Column 9). Nonetheless, sample sizes for examining the relationship between CTC receipt and food security are large in each of the four years (~20,000 respondents).⁷

One may also use CPS data to examine how the CTC has affected population food security over time. This requires extending the December (MIS 1) to ASEC linkage (MIS 4) forward in time to include the subsequent December (MIS 5) and ASEC (MIS 8) observations. For example, individuals from MIS 1

⁷ This very process of linking first the March and December Basic Monthly CPS files and then the December Basic Monthly file to the ASEC file was omitted in a recently published paper on poverty and food insecurity [14]. The authors draw on poverty data from the ASEC and food security data from the December Food Security supplement. Rather than make linkages between the ASEC and Food Security supplement, the authors impute poverty, which is available in the ASEC, for the sample of December respondents in their analysis for whom poverty is not available. Imputation allows the authors to retain more cases since they are not linking to the ASEC, though making the linkages to the ASEC would allow the authors to get exact rather than imputed measures of poverty. At the very least, using CPSID and MARBASECID, the authors could compare the imputed and actual poverty values for the linked sample.

in December 2005 are linked first to the 2006 March Basic Monthly CPS using CPSID (and then to the 2006 ASEC using MARBASECID); CPSID is then used again to link to December 2006 (when respondents are MIS 5) and then to March 2007 (via CPSID and then to the 2007 ASEC via MARBASECID). About 5% of respondents from each of the December Basic Monthly CPS surveys from 2005-2008, with both food security and child tax credit data in both years, may be linked in this way (see Table 4, Column 11). Of those eligible (MIS 1 in December of a given year), about 70% are linked (see Table 4, Column 12), and the resulting samples are sizeable (~7,000 observations for each year).

Section 4b – Substantive Example #2: Outgoing Rotation Groups and the ASEC

A popular set of employment questions have been asked only of the outgoing rotation groups (ORG) from MIS 4 and 8 of each Basic Monthly Survey. This set of variables is commonly known as the ORG questions or the Earner Study questions. Information is collected on topics such as usual hours worked, hourly wage rate, usual weekly earnings, union membership, class of worker, and multiple job holdings (hereafter referred to as the "earner study" questions). Earnings data from the earner study refer to a usual week in the last month while the earnings data collected in the ASEC refer to the "past year". Given these differences, researchers may want to use these variables in combination with ASEC variables. For example, any research question looking at unionization alongside taxes paid or poverty will require the use of both the ORG and the ASEC. Using the earner study variables from the March Basic Monthly CPS with the ASEC, researchers encounter a substantial reduction in observations—typically about 20% of the March Basic Monthly CPS (see Table 5). This limitation may be overcome by linking ASEC and ORG data from surrounding non-March months. By linking the ASEC to subsequent ORG responses from the Basic Monthly CPS in April, May, and June, the number of cases is nearly quadrupled, increasing the power for combining earnings from the ASEC with information about union participation from the Basic Monthly CPS.

Because not all earner study variables are part of the ASEC file, at the very least using the full set of earner study variables with the ASEC data requires linking the March Basic Monthly CPS with the ASEC; MARBASECID drastically simplifies this effort. About 25% of March Basic Monthly CPS respondents would have this weekly wage data available since only the outgoing rotations (MIS 5 and 8) respond to the earner study questions. Using CPSID and extending the linkage of ORG data from different months to the ASEC, researchers can easily increase their sample sizes. Table 5 shows for the years 2005-2009 the number of cases in the March Basic, linkages to their ORG months, and the number of cases with earnings data collected for individuals⁸ in ORGs. Researchers can leverage the power of the short panel aspect of the CPS and use CPSID to link from March to April, May, and June and MARBASECID to link from March to the ASEC; the resulting sample size for 2005 is 100,042 compared to 26,503 if only ORG data from March are used (Table 5, Column 4). Larger sample sizes, for example, allow for detailed subgroup analyses which would otherwise be limited.

Researchers may also make these kinds of linkages across years to get ASEC data combined with earnings data from two points in time. The process just described would be performed for two points in time, year x and year $x+1$. Year x and year $x+1$ are then linked together using CPSID. As Table 5 shows, this is possible for just over one quarter of the March Basic Monthly CPS respondents (26% in 2005)⁹, which is substantially higher than if we only linked individuals from MIS 4 of the 2005 March Basic Monthly CPS to 2006, which would be 7% (or 9,548 individuals) of the 2005 March Basic Monthly CPS sample (see Table 5, Column 7). Including individuals in the March Basic Monthly whose earnings data come from April, May, or June increases the total sample size to 35,030 in 2005 (see Table 5, Column 6). Patterns are similar for the 2006-2009 period.

[Table 5 about here]

⁸ Recall that only civilians age 15 and older who are currently employed as a wage or salaried worker respond to ORG questions.

⁹ Only half of the March Basic Monthly CPS respondents are linkable across years because individuals in MIS 5-8 in year x will not be in the CPS in year $x+1$.

The value of MARBASECID and CPSID is evident in recent research on unionization and poverty published in the *American Sociological Review* [15]. The authors replicate a previous study using the ASEC union status variable. The limitations of the analysis are acknowledged: “the CPS asks the union membership question only for one-fourth of the sample (the two outgoing rotation groups). As a result the CPS samples are much smaller” (p. 886). The substantial loss of observations the authors lament could easily be overcome with MARBASECID and CPSID. Using MARBASECID to link the March Basic Monthly CPS and the ASEC and then CPSID to link the ASEC to other monthly surveys, the authors could have combined earnings from the ASEC with union membership information from April, May, and June and retained a much larger number of observations (roughly four times as many).

Section 5 – Conclusion

Our objectives in this paper were threefold. First, we described the ASEC, its oversamples, and the complexities of linking the ASEC to other CPS monthly data. Researchers who want to use the ASEC with other CPS data must understand how the ASEC is different from other CPS monthly data and why sample sizes in the ASEC are larger than in the Basic Monthly CPS. Second, we documented our methods for linking the ASEC to the March Basic Monthly CPS, which is required to link the ASEC to any other months of CPS data. Our description of the challenges associated with linking and our approach to this work allows others to replicate our work. Third, we provided two possible research applications for linking individuals in the ASEC to surrounding months thereby illustrating some advantages of linking the ASEC to other CPS Basic Monthly data. This kind of information is critical for researchers designing new longitudinal analyses that incorporate the popular – and not available elsewhere in the CPS – information from the ASEC on topics such as poverty, taxes, and detailed income.

With support from the National Institute for Child Health and Human Development, we are developing integrated data, dissemination software, and associated metadata that will make combining information from the ASEC and other CPS Basic Monthly files dramatically easier. The creation of

MARBASECID, which unlocks the vast research potential of longitudinal CPS data by facilitating the inclusion of the ASEC, promises to serve the scientific community. MARBASECID and CPSID will both be freely available exclusively via IPUMS-CPS, updated as new data become available and fully documented for use by researchers around the world. These investments in data infrastructure eliminate the need for each individual researcher to perform the tedious task of linking Basic Monthly CPS data to ASEC data, reduces technical errors in linking, simplifies replication of existing studies, and encourages researchers to rethink the possibilities of CPS data.

The changing and complex oversamples of the ASEC present serious obstacles for linking March Basic Monthly CPS responses (and other months) to the ASEC. These barriers to use are real as evidenced by the limited research linking ASEC to monthly CPS data and previous work documenting how to link ASEC observations one year apart [1]. The opportunities are also rich as indicated by recent work that uses ASEC data with other monthly data through imputation as opposed to direct linkages. The availability of the ASEC as a part of a panel of linked CPS data dramatically magnifies the utility of CPSID – the variable that links CPS monthly observations across time – since the ASEC is by far the most widely used of CPS data.

Acknowledgments

We thank Camilo Bohorquez, Maggie Charleroy, Julia Drew, Marina Gorsuch, and Joe Grover for helpful feedback on earlier versions of this paper. We also thank Ben Klaas for developing software to link the ASEC to other CPS data. This study was supported by the Minnesota Population Center at the University of Minnesota (R24HD041023) and the Data Extract Builder of the American Time Use Survey (University of Maryland, R01HD053654; University of Minnesota, Z195701), both funded through grants from the Eunice Kennedy Shriver National Institute for Child Health and Human Development (NICHD).

References

- [1] Madrian BC, Lefgren LJ. An approach to longitudinally matching Current Population Survey (CPS) respondents. *Journal of Economic and Social Measurement*. 2000 Jan 1;26(1):31-62.
- [2] Feng S. The longitudinal matching of current population surveys: A proposed algorithm. *Journal of Economic and Social Measurement*. 2001 Jan 1;27(1, 2):71-91.
- [3] Feng S. Longitudinal matching of recent current population surveys: Methods, non-matches and mismatches. *Journal of Economic and Social Measurement*. 2008 Jan 1;33(4):241-52.
- [4] Katz A, Tenter K, Sidel P. Comparison of alternative ways of deriving panel data from the annual demographic files of the current population survey. *Review of Public Data Use*. 1984 Mar 1;12(1):35-44.
- [5] Pitts A. Matching adjacent years of the Current Population Survey, Unpublished manuscript, Los Angeles, CA: Unicon Research Corporation; 1988.
- [6] Drew JA, Flood S, Warren JR. Making full use of the longitudinal design of the Current Population Survey: Methods for linking records across 16 months. *Journal of economic and social measurement*. 2014;39(3):121.
- [7] U.S. Census Bureau, 2010. Annual Social and Economic (ASEC) Supplement. Technical Documentation. Washington, D.C.: U.S. Department of Labor, Bureau of the Census.
- [8] U.S. Bureau of Labor Statistics, 2006. Design and Methodology: Current Population Survey. Technical Paper 66. Washington, D.C.: U.S. Department of Labor, Bureau of the Census.
- [9] U.S. Census Bureau, 1978. Annual Demographic File (March Supplement of Current Population Survey). Technical Documentation. Washington, D.C.: U.S. Department of Labor, Bureau of the Census.
- [10] U.S. Bureau of Labor Statistics, 2002. Design and Methodology: Current Population Survey. Technical Paper 63RV. Washington, D.C.: U.S. Department of Labor, Bureau of the Census.
- [11] U.S. Census Bureau. 2014. American Time Use Survey User's Guide: Understanding ATUS 2003 to 2013. Technical Paper. Washington, D.C.: Bureau of the Census.
- [12] U.S. Census Bureau. (1996). Appendix for March 1994. Retrieved from <http://www.nber.org/morg/docs/usernote.asc>
- [13] Gundersen C, Ziliak JP. Childhood food insecurity in the US: Trends, causes, and policy options. *The Future of Children*. 2014;24(2):1-9.
- [14] Wight V, Kaushal N, Waldfogel J, Garfinkel I. Understanding the link between poverty and food insecurity among children: Does the definition of poverty matter?. *Journal of Children and Poverty*. 2014 Jan 2;20(1):1-20.
- [15] Brady D, Baker RS, Finnigan R. When Unionization Disappears State-Level Unionization and Working Poverty in the United States. *American Sociological Review*. 2013 Oct 1;78(5):872-96.
- [16] U.S. Census Bureau. (2010). Analysis of Perturbed and Unperturbed Age Estimates: 2008. Retrieved from https://www.census.gov/cps/user_note_age_estimates.html

Table 1. CPS Rotation Pattern

	Year X												Year X+1			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
MiS 1	Jan _X	Feb _X	Mar _X	Apr _X	May _X	Jun _X	Jul _X	Aug _X	Sep _X	Oct _X	Nov _X	Dec _X	Jan _{X+1}	Feb _{X+1}	Mar _{X+1}	Apr _{X+1}
MiS 2	Dec _{X-1}	Jan _X	Feb _X	Mar _X	Apr _X	May _X	Jun _X	Jul _X	Aug _X	Sep _X	Oct _X	Nov _X	Dec _X	Jan _{X+1}	Feb _{X+1}	Mar _{X+1}
MiS 3	Nov _{X-1}	Dec _{X-1}	Jan _X	Feb _X	Mar _X	Apr _X	May _X	Jun _X	Jul _X	Aug _X	Sep _X	Oct _X	Nov _X	Dec _X	Jan _{X+1}	Feb _{X+1}
MiS 4	Oct _{X-1}	Nov _{X-1}	Dec _{X-1}	Jan _X	Feb _X	Mar _X	Apr _X	May _X	Jun _X	Jul _X	Aug _X	Sep _X	Oct _X	Nov _X	Dec _X	Jan _{X+1}
MiS 5	Jan _{X-1}	Feb _{X-1}	Mar _{X-1}	Apr _{X-1}	May _{X-1}	Jun _{X-1}	Jul _{X-1}	Aug _{X-1}	Sep _{X-1}	Oct _{X-1}	Nov _{X-1}	Dec _{X-1}	Jan _X	Feb _X	Mar _X	Apr _X
MiS 6	Dec _{X-2}	Jan _{X-1}	Feb _{X-1}	Mar _{X-1}	Apr _{X-1}	May _{X-1}	Jun _{X-1}	Jul _{X-1}	Aug _{X-1}	Sep _{X-1}	Oct _{X-1}	Nov _{X-1}	Dec _{X-1}	Jan _X	Feb _X	Mar _X
MiS 7	Nov _{X-2}	Dec _{X-2}	Jan _{X-1}	Feb _{X-1}	Mar _{X-1}	Apr _{X-1}	May _{X-1}	Jun _{X-1}	Jul _{X-1}	Aug _{X-1}	Sep _{X-1}	Oct _{X-1}	Nov _{X-1}	Dec _{X-1}	Jan _X	Feb _X
MiS 8	Oct _{X-2}	Nov _{X-2}	Dec _{X-2}	Jan _{X-1}	Feb _{X-1}	Mar _{X-1}	Apr _{X-1}	May _{X-1}	Jun _{X-1}	Jul _{X-1}	Aug _{X-1}	Sep _{X-1}	Oct _{X-1}	Nov _{X-1}	Dec _{X-1}	Jan _X

Note: Table reports the month and year in which respondents began the CPS, separately by calendar month and survey month-in-sample. For example, "Oct_{X-2}" in the bottom left cell means that respondents in month-in-sample 8 in January of Year X first entered the CPS in October of Year X-2.

Table 2. Administering the ASEC to Oversamples Over Time.

ASEC Sample Includes:	Month ASEC Administered	1947-1955	1956-1975	1976-2000	2001-2003	2004-present
April Basic	April	x	--	--	--	--
March Basic	March	--	x	x	x	x
<i>"Hispanic Oversample"</i>						
<i>November</i>						
MIS 1	February ^c	--	--	x	x	x
MIS 2	March ^c	--	--	x	x	x
MIS 3	March ^c	--	--	x	x	x
MIS 4	March ^c	--	--	x	x	x
MIS 5	February ^c	--	--	x	x	x
MIS 6	March ^c	--	--	x	x	x
MIS 7	March ^c	--	--	x	x	x
MIS 8	March ^c	--	--	x	x	x
<i>Non-Hispanic^a</i>						
November (MIS 6,7,8)	March ^d	--	--	--	x	--
August (MIS 8)	February ^d	--	--	--	--	x
September (MIS 8)	February ^d	--	--	--	--	x
October (MIS 8)	April ^d	--	--	--	--	x
February (MIS 4, 8) ^b	February ^e	--	--	--	x	x
April (MIS 1, 5)	April ^e	--	--	--	x	x

^aIncludes non-Hispanic non-Whites and non-Hispanic Whites with children 18 years or less

^bThese cases are identified in November as MIS 1,5

^cThese dwellings are interviewed a 9th and 10th time which can be considered MIS 9 and MIS 10

^dThese dwellings are interviewed a 9th time which can be considered MIS 9

^eThese dwellings are part of the split-path supplement assignment.

Table 3. ASEC-March Basic Matches & Match Validation by Year, 1989-2013.

Linking Period									
1989-1993	<i>First Stage Merge Variables: IPUMS (HRHHID, LINENO, AGE, SEX, RACE) Census (H-IDNUM, A-LINENO, A-AGE, A-SEX, A-RACE)</i>								
	<i>Additional Variables for Second Stage Merge: N/A</i>								
	Year	Persons	1st Stage Matches	2nd Stage Matches	Non-Matches	Match Rate (Matches/Persons)	Unvalidated Matches		
							Sex	Race	Age
	1989	137,384	137,384	N/A	0	100.00	0	0	0
	1990	148,730	148,730	N/A	0	100.00	0	0	0
1991	148,228	148,228	N/A	0	100.00	0	0	0	
1992	145,355	145,355	N/A	0	100.00	0	0	0	
1993	144,618	144,618	N/A	0	100.00	0	0	0	
1994-1995^a	<i>First Stage Merge Variables: IPUMS (HRHHID, HUUHNUM, STATECENSUS, LINENO) Census (H-IDNUM, H-HHNUM, GESTCEN, A-LINENO)</i>								
	<i>Additional Variables for Second Stage Merge: IPUMS (AGE, SEX, RACE, NUMPREC) Census (PRTAGE, PESEX, PTDTRACE, HRNUMHOU)</i>								
	Year	Persons	1st Stage Matches	2nd Stage Matches	Non-Matches	Match Rate (Matches/Persons)	Unvalidated Matches		
						Sex	Race	Age	
1994	140,625	140,079	546	0	100.00	115	95	212	
1995 ^b	138,872	137,473	448	951	99.32	0	0	0	
1996-2000^a	<i>First Stage Merge Variables: IPUMS (HRHHID, HUUHNUM, STATECENSUS, LINENO) Census (H-IDNUM, H-HHNUM, GESTCEN, A-LINENO)</i>								
	<i>Additional Variables for Second Stage Merge: IPUMS (AGE, SEX, RACE, NUMPREC) Census (PRTAGE, PESEX, PTDTRACE, HRNUMHOU)</i>								
	Year	Persons	1st Stage Matches	2nd Stage Matches	Non-Matches	Match Rate (Matches/Persons)	Unvalidated Matches		
						Sex	Race	Age	
1996 ^b	120,186	120,179	4	3	99.9975	3	3	3	
1997	120,989	120,981	8	0	100.00	0	0	0	
1998	120,507	120,504	3	0	100.00	0	0	0	
1999	120,776	120,760	16	0	100.00	0	0	0	
2000	121,194	121,149	45	0	100.00	0	0	0	
2001-2004^a	<i>First Stage Merge Variables: IPUMS (HRHHID, HUUHNUM, STATECENSUS, LINENO) Census (H-IDNUM, H-HHNUM, GESTCEN, A-LINENO)</i>								
	<i>Additional Variables for Second Stage Merge: IPUMS (AGE, SEX, RACE, NUMPREC, OCC) Census (PRTAGE, PESEX, PTDTRACE, HRNUMHOU, PEIOLOCD)</i>								
	Year	Persons	1st Stage Matches	2nd Stage Matches	Non-Matches	Match Rate (Matches/Persons)	Unvalidated Matches		
						Sex	Race	Age	
2001 ^b	116,663	116,585	78	0	100.00	10	213	573	
2002 ^b	139,660	139,592	68	0	100.00	0	0	128	
2003 ^b	141,288	141,220	68	0	100.00	0	0	3957	
2004 ^b	138,350	138,277	73	0	100.00	0	154	1832	
2005-2013	<i>First Stage Merge Variables: IPUMS (HRHHID, HRHHID2, LINENO) Census (H-IDNUM, H-IDNUM2, A-LINENO)</i>								
	<i>Additional Variables for Second Stage Merge: N/A</i>								
	Year	Persons	1st Stage Matches	2nd Stage Matches	Non-Matches	Match Rate (Matches/Persons)	Unvalidated Matches		
						Sex	Race	Age	
2005	136,315	136,315	N/A	0	100.00	0	0	0	
2006	135,028	135,028	N/A	0	100.00	0	0	0	
2007	133,817	133,817	N/A	0	100.00	0	0	0	
2008	133,155	133,155	N/A	0	100.00	0	0	0	
2009 ^b	134,650	134,650	N/A	0	100.00	0	0	6	
2010	135,478	135,478	N/A	0	100.00	0	0	0	
2011	132,275	132,275	N/A	0	100.00	0	0	0	
2012	131,372	131,372	N/A	0	100.00	0	0	0	
2013	130,534	130,534	N/A	0	100.00	0	0	0	

^aSee Appendix for details on second-stage merging.

^bSee Appendix for notes about non-matches.

Table 4. Linking the Food Security Supplement (December) to the Child Tax Credit (ASEC), 2005-2008.

Panel A: Linking December to ASEC

	December Basic			Linked to March Basic ¹			Linked to ASEC who have FSS and CTC ²		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	# of Persons	# Eligible to Link to March	% Eligible to Link to March (Col2/Col1)		% of Persons in December Basic (Col4/Col1)	% of Persons Linked of Those Eligible (Col4/Col2)	# of Linked Persons	% Linked of December Basic (Col7/Col1)	% Linked of Eligible (Col7/Col2)
December 2005	138,903	34,024	24.49%	29,807	21.46%	87.61%	21,091	15.18%	61.99%
December 2006	136,174	32,851	24.12%	29,407	21.60%	89.52%	20,324	14.93%	61.87%
December 2007	135,275	32,798	24.25%	29,757	22.00%	90.73%	20,455	15.12%	62.37%
December 2008	133,672	32,606	24.39%	28,873	21.60%	88.55%	19,975	14.94%	61.26%

Panel B: Linking Across Years

(10)	December to ASEC in year x and December to ASEC in year x+1				
	(11)	(12)	(13)	(14)	
# of Persons in December of year x	# Linked from December of year x to March of year x+2	% Linked from December of year x to March of year x+2 (Col11/Col10)	Dec MIS 1	Linked Obs / Dec MIS 1 Obs (Col 11/Col 13)	
December 2005	138,903	7,213	5.19%	10,755	67.07%
December 2006	136,174	7,143	5.25%	10,398	68.70%
December 2007	135,275	7,081	5.23%	10,350	68.42%
December 2008	133,672	7,068	5.29%	9,948	71.05%

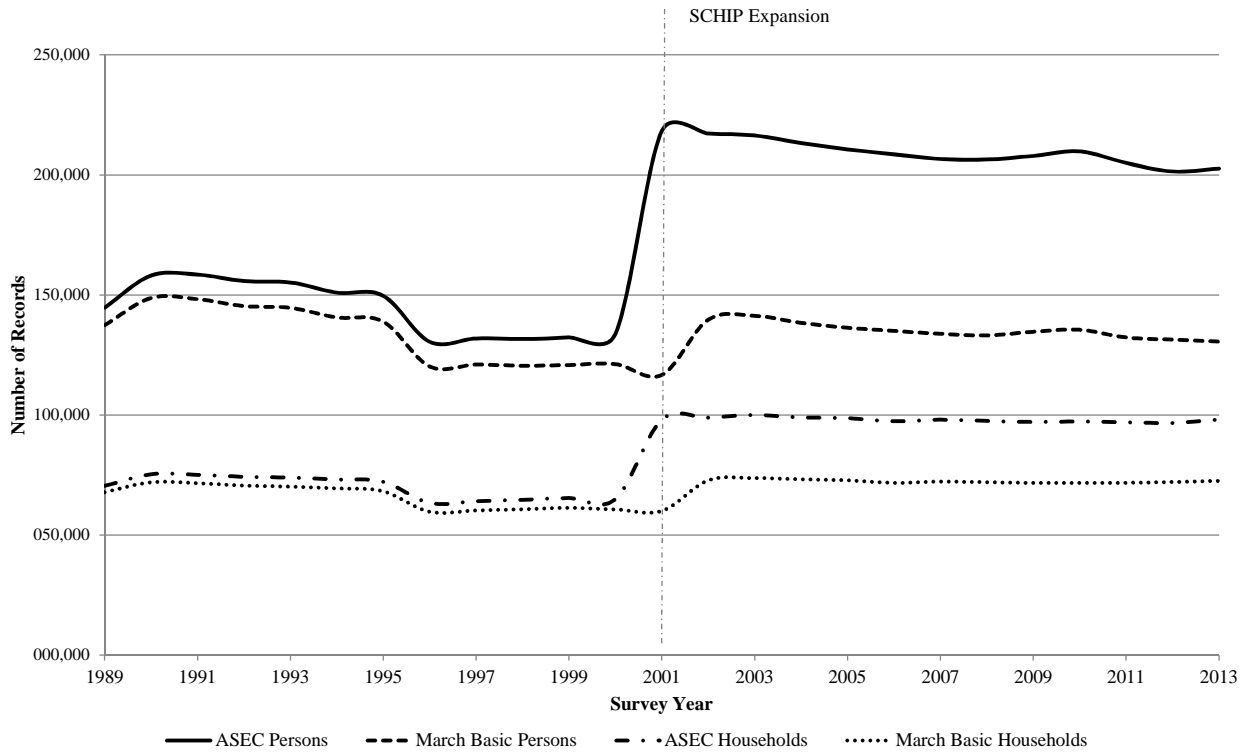
¹The corresponding linkage between the March Basic and ASEC is perfect. That is, all respondents from the March Basic are identified in the ASEC.

²These numbers are conditional on having food security responses in the December Basic Monthly CPS and the Child Tax Credit question in the ASEC.

Table 5. Linking the ASEC to ORG observations from April, May, and June, 2005 - 2009.

March MIS	Month of MIS 4 or 8	Linking Within a Year					Linking Across Years	
		(1) Number of Cases in March Basic	(2) Number Linked to MIS 4 and 8	(3) Percentage Linked to March (Col2/Col3)	(4) Number Linked Cases with Earnings Data	(5) Percentage Linked with Earnings Data (Col4/Col2)	(6) Number Linked Cases with Earnings Data	(7) Percentage Linked with Earnings Data (Col6/Col2)
2005								
MIS 4, 8		34,521	34,521	100.00%	26,503	76.77%	9,548	27.66%
MIS 3, 7	April	34,488	33,090	95.95%	25,430	73.74%	8,818	25.57%
MIS 2, 6	May	34,018	31,891	93.75%	24,640	72.43%	8,686	25.53%
MIS 1, 5	June	33,288	30,314	91.07%	23,469	70.50%	7,978	23.97%
	<i>Total</i>	136,315	129,816	95.23%	100,042	73.39%	35,030	25.70%
2006								
MIS 4, 8		33,875	33,875	100.00%	26,116	77.10%	9,931	29.32%
MIS 3, 7	April	33,957	32,760	96.47%	25,315	74.55%	9,546	28.11%
MIS 2, 6	May	33,749	31,458	93.21%	24,476	72.52%	9,161	27.14%
MIS 1, 5	June	33,447	30,229	90.38%	23,431	70.05%	8,740	26.13%
	<i>Total</i>	135,028	128,322	95.03%	99,338	73.57%	37,378	27.68%
2007								
MIS 4, 8		33,443	33,443	100.00%	25,940	77.56%	10,166	30.40%
MIS 3, 7	April	33,737	32,603	96.64%	25,214	74.74%	9,579	28.39%
MIS 2, 6	May	33,324	31,407	94.25%	24,337	73.03%	9,352	28.06%
MIS 1, 5	June	33,313	30,537	91.67%	23,720	71.20%	8,953	26.88%
	<i>Total</i>	133,817	127,990	95.65%	99,211	74.14%	38,050	28.43%
2008								
MIS 4, 8		33,520	33,520	100.00%	26,135	77.97%	10,299	30.72%
MIS 3, 7	April	33,556	32,446	96.69%	25,305	75.41%	9,897	29.49%
MIS 2, 6	May	32,806	30,732	93.68%	24,086	73.42%	9,372	28.57%
MIS 1, 5	June	33,273	30,521	91.73%	23,863	71.72%	9,207	27.67%
	<i>Total</i>	133,155	127,219	95.54%	99,389	74.64%	38,775	29.12%
2009								
MIS 4, 8		33,250	33,250	100.00%	26,049	78.34%	10,343	7.68%
MIS 3, 7	April	34,352	33,189	96.61%	25,887	75.36%	10,020	7.44%
MIS 2, 6	May	33,263	31,310	94.13%	24,591	73.93%	9,431	7.00%
MIS 1, 5	June	33,785	31,227	92.43%	24,384	72.17%	9,185	6.82%
	<i>Total</i>	134,650	128,976	95.79%	100,911	74.94%	38,979	28.95%

Figure 1. Comparing the Size of the March Basic Monthly Survey and the ASEC Oversample, 1989-2013



Appendix A - Match Validity

Match rates based on the algorithms we use are extremely high except in 1995 and 1996. We validate matches from 1994 forward by comparing AGE, SEX, and RACE in the March Basic Monthly CPS to the ASEC. As is evident in Appendix C, nearly all matches are validated. We document the problems we encounter in years where we fail to match or match incorrectly. Due to duplicate IDs in the 1989-1993 period, we are required to use AGE, SEX, and RACE as part of our linking algorithm and thus cannot validate on AGE, SEX, and RACE (but will validate on these variables by construction).

As evident in Table 3, the match rates based on the matching algorithms results in extremely high match rates, with the exception of 1995 and 1996. The validity of these matches is confirmed with a rather higher success rate based on age sex and race. This section provides potential explanations for invalid matches.

1994

115 observations fail to match on sex, 95 on race and 212 on age. We found no documentation to explain any of these failures. Our analysis shows that no observations fail to match on all three variables while only 2 observations fail to match on both sex and race.

1995

951 records in the March Basic Monthly CPS cannot be linked to the ASEC. Despite trying to match using various algorithms, IPUMS-CPS was unable to find links for these records. Furthermore, no Census Bureau documentation is available on this issue. It is possible that these non-links are a result of the CPS redesign that occurred in 1994.

1996

3 person records cannot be matched. No explanation has been uncovered.

2001

Several linked records do not match on age, sex, or race. No Census Bureau documentation on this issue has been located. However, 2001 was a CPS redesign year, which may be an explanation.

2002

The 128 age non-matches are most likely due to age perturbation. In August 2002 "depending on the demographic characteristics of all members of the household, ages of selected household members were adjusted to increase confidentiality protection" [16]. Since the ASEC is typically released in September, it is plausible and likely that these age non-matches are due to this perturbation issue.

2003

The 3,957 cases that do not match on age are a coding issue. That is, the ASEC topcodes at 85 while the Basic topcodes at 80. Thus, in validating the matches, persons ages 81-85 in the ASEC will be assigned the value of their actual age while their age in the Basic will be topcoded.

2004

The 1,832 age non-matches are also top code issues. Similarly, the 154 non-match cases on race are also a coding issue. The Basic Monthly CPS codes "3 or more races" while the ASEC actually lists out the three races.

2009

The 6 observations that do not match on age are most likely an age perturbation issue.

Appendix B - Details of Merging

The merging of the 1994 March Basic Monthly CPS to ASEC file requires three manual corrections in order to match correctly. These changes are apparent upon visual inspection. First, a correction is needed for the HUUHNUM of one three households. In 1994, a unique household in the Basic can be identified by the HRHHID and HRHHID2 while in the ASEC it can be identified by its H-seq number. As is apparent in the figure below, there are three distinct households with the same HRHHID. The problem when it comes to linking is that only HUUHNUM is common to both files and all are equal to 1 (resulting in duplicate records based on HRHHID and HUUHNUM). Visual inspection makes it clear that the households from the Basic with HRHHID2 63011 is identical to the ASEC household with HSEQ 12307. Similarly, HRHHID2 63001 is identical to HSEQ 12306. For matching across the Basic Monthly CPS and ASEC, we re-assign the HUUHNUM values for these households (2 and 3, respectively).

	hrhhid	hrhhid2	huhhnum	new huhhnum	year	mis	numper	pernum	age	sex	race
Basic	880669103209	63021	1	1	1994	2	4	1	34	2	2
Basic	880669103209	63021	1	1	1994	2	4	2	15	1	2
Basic	880669103209	63021	1	1	1994	2	4	3	11	1	2
Basic	880669103209	63021	1	1	1994	2	4	4	10	1	2
Basic	880669103209	63011	1	2	1994	2	1	1	72	2	2
Basic	880669103209	63001	1	3	1994	2	2	1	34	2	1
Basic	880669103209	63001	1	3	1994	2	2	2	21	1	2
	hrhhid	hseq	huhhnum	new huhhnum	year	mis	numper	pernum	age	sex	race
ASEC	880669103209	12308	1	1	1994	2	4	1	34	2	2
ASEC	880669103209	12308	1	1	1994	2	4	2	15	1	2
ASEC	880669103209	12308	1	1	1994	2	4	3	11	1	2
ASEC	880669103209	12308	1	1	1994	2	4	4	10	1	2
ASEC	880669103209	12307	1	2	1994	2	1	1	72	2	2
ASEC	880669103209	12306	1	3	1994	2	2	1	33	2	1
ASEC	880669103209	12306	1	3	1994	2	2	2	33	1	2

Another correction that must be made involves the following care. Looking closely at the data, it is evident that the Basic observation with HRHHID2 63001 should be matched to the ASEC observation with HSEQ 258.

	hrhhid	hrhhid2	huhhnum	year	mis	numper	pernum	age	sex	educ	race	occ
Basic	160999430499	63021	1	1994	1	1	1	48	2	40	1	-1
Basic	160999430499	63001	1	1994	1	1	1	48	2	40	1	20
	hrhhid	hseq	huhhnum	year	mis	numper	pernum	age	sex	educ	race	occ
ASEC	160999430499	258	1	1994	1	1	1	48	2	40	1	20
ASEC	160999430499	260	1	1994	1	1	1	48	2	40	1	0

A more complicated duplicate is below in which the records are identical save for HRHHID2. Leveraging the longitudinal component of the survey to figure out the correct match, we locate the observations in 1995 March Basic Monthly CPS and the 1995 ASEC when both should have been in MIS 6 according to the CPS rotation pattern. Only HRHHID2 63001 and HSEQ 13308 is in the 1995 March Basic Monthly CPS and ASEC files, so we match and retain the records which also appear in 1995.

	hrhhid	hrhhid2	huhhnum	year	mis	numper	pemum	age	sex	educ	race	occ	marst
Basic	930479150329	63001	1	1994	2	1	1	71	1	32	1	0	3
Basic	930479150329	63011	1	1994	2	1	1	71	1	32	1	0	3
	hrhhid	h_seq	huhhnum	year	mis	numper	pemum	age	sex	educ	race	occ	marst
ASEC	930479150329	13308	1	1994	2	1	1	71	1	32	1	0	3
ASEC	930479150329	13309	1	1994	2	1	1	71	1	32	1	0	3

In 2003, we identify two problematic cases in the March Basic Monthly CPS. Consider the two 68 year olds of the same sex, race, and education level (below). Using HRHHID2 from the March Basic Monthly CPS, we see that the person who is age 48 is in the same household as the first 68 year old. Thus, we match the first 68 year old in the ASEC (hseq=62477) to the 68 year old in HRHH ID2=76261 in the Basic.

	hrhhid	hrhhid2	huhhnum	year	mis	numper	pemum	age	sex	educ	race
Basic	130962064655659	76261	1	2003	4	2	1	48	1	40	1
Basic	130962064655659	76001	1	2003	4	2	1	78	1	36	1
Basic	130962064655659	76261	1	2003	4	2	2	68	2	39	1
Basic	130962064655659	76001	1	2003	4	2	2	68	2	39	1
	hrhhid	hseq	huhhnum	year	mis	numper	pemum	age	sex	educ	race
ASEC	130962064655659	62476	1	2003	4	2	1	78	1	36	1
ASEC	130962064655659	62477	1	2003	4	2	1	48	1	40	1
ASEC	130962064655659	62476	1	2003	4	2	2	68	2	39	1
ASEC	130962064655659	62477	1	2003	4	2	2	68	2	39	1

The next set of observations that is troublesome contains two people whose age does not match between the Basic Monthly CPS and the ASEC. In order to match, we change the age for one of the observations. Note that original values are maintained in the original files.

	hrhhid	hrhhid2	year	mis	numper	pemum	age	sex	educ	race
Basic	67843683692593	76261	2003	3	2	2	66	2	34	1
	hrhhid	huhhnum	year	mis	numper	pemum	age	sex	educ	race
ASEC	67843683692593	1	2003	3	2	2	67	2	34	1

In 2004, we need only adjust the age of the following observation. Again, the original age values are retained in the original files.

	hrhid	hrhid2	year	mis	numper	pernum	age	sex	educ	race
Basic	263943067909060	76261	2004	6	1	1	80	1	34	1
	hrhid	huhhnum	year	mis	numper	pernum	age	sex	educ	race
ASEC	263943067909060	1	2004	6	1	1	85	1	34	1

Appendix C. Actual Number of Basic CPS's that Link to March Basics by MIS

March Basic Year	December					
	MIS 1			MIS 5		
	In Basic	Link to March	Percent	In Basic	Link to March	Percent
1989	--- ^a	--- ^a	--- ^a	--- ^a	--- ^a	--- ^a
1990	18,639	16,542	88.75%	18,389	16,019	87.11%
1991	17,982	15,888	88.36%	19,172	16,705	87.13%
1992	18,345	16,247	88.56%	18,090	15,909	87.94%
1993	17,910	16,073	89.74%	18,227	16,272	89.27%
1994	17,622	15,637	88.74%	17,726	15,659	88.34%
1995	17,179	15,640	91.04%	17,306	15,951	92.17%
1996	15,892	13,052	82.13%	15,632	12,989	83.09%
1997	15,180	13,899	91.56%	15,035	13,852	92.13%
1998	15,058	13,889	92.24%	14,603	13,488	92.36%
1999	15,072	13,753	91.25%	15,056	13,853	92.01%
2000	14,163	12,979	91.64%	15,078	13,903	92.21%
2001	14,251	12,948	90.86%	14,556	13,419	92.19%
2002	17,121	15,569	90.94%	17,575	16,142	91.85%
2003	17,809	16,225	91.11%	17,298	15,936	92.13%
2004	16,808	15,383	91.52%	17,623	16,194	91.89%
2005	16,512	14,848	89.92%	17,512	16,030	91.54%
2006	16,373	14,809	90.45%	16,478	14,998	91.02%
2007	16,381	14,700	89.74%	16,417	14,707	89.58%
2008	16,166	14,693	90.89%	16,440	15,064	91.63%
2009	15,481	14,194	91.69%	15,910	14,679	92.26%
2010	16,337	14,878	91.07%	16,168	14,963	92.55%
2011	16,057	14,575	90.77%	16,754	15,273	91.16%
2012	16,200	14,636	90.35%	15,849	14,461	91.24%
2013	16,108	14,477	89.87%	15,922	14,428	90.62%

^a: No matches are presented here since the March 1989 sample links to the December 1988, which we do not include here.

Appendix C. Actual Number of Basic CPS's that Link to March Basics by MIS, continued

March Basic Year	January											
	MIS 1			MIS 2			MIS 5			MIS 6		
	In Basic	Link to March	Percent	In Basic	Link to March	Percent	In Basic	Link to March	Percent	In Basic	Link to March	Percent
1989	17,086	15,543	90.97%	17,784	16,182	90.99%	16,851	15,013	89.09%	17,725	15,901	89.71%
1990	18,080	16,439	90.92%	19,101	17,411	91.15%	18,403	16,521	89.77%	18,718	16,717	89.31%
1991	18,505	16,743	90.48%	18,126	16,479	90.91%	18,476	16,423	88.89%	19,234	17,221	89.53%
1992	17,492	15,953	91.20%	18,513	16,965	91.64%	18,735	16,751	89.41%	18,282	16,479	90.14%
1993	18,020	16,546	91.82%	18,222	16,735	91.84%	17,520	15,877	90.62%	18,330	16,722	91.23%
1994	16,863	15,652	92.82%	18,037	16,714	92.67%	17,582	16,378	93.15%	17,885	16,775	93.79%
1995	17,560	16,278	92.70%	17,729	16,487	92.99%	17,135	15,846	92.48%	17,767	16,703	94.01%
1996	14,517	13,445	92.62%	15,494	14,292	92.24%	14,795	13,806	93.32%	14,831	13,970	94.19%
1997	14,975	14,067	93.94%	15,531	14,552	93.70%	14,636	13,731	93.82%	15,294	14,445	94.45%
1998	14,918	13,920	93.31%	15,808	14,794	93.59%	14,592	13,734	94.12%	15,190	14,252	93.82%
1999	14,941	13,905	93.07%	15,479	14,443	93.31%	14,676	13,737	93.60%	15,480	14,553	94.01%
2000	14,807	13,824	93.36%	14,920	13,960	93.57%	15,161	14,086	92.91%	15,610	14,631	93.73%
2001	13,882	12,792	92.15%	14,763	13,705	92.83%	14,845	13,716	92.39%	14,838	13,972	94.16%
2002	17,552	16,368	93.25%	17,716	16,476	93.00%	16,882	15,758	93.34%	17,846	16,792	94.09%
2003	17,128	15,950	93.12%	18,412	17,200	93.42%	17,275	16,250	94.07%	17,691	16,693	94.36%
2004	16,647	15,497	93.09%	17,474	16,331	93.46%	16,901	15,785	93.40%	18,129	16,963	93.57%
2005	16,710	15,437	92.38%	16,991	15,644	92.07%	17,449	16,120	92.38%	17,843	16,721	93.71%
2006	16,747	15,448	92.24%	16,993	15,704	92.41%	16,866	15,469	91.72%	16,842	15,747	93.50%
2007	16,657	15,323	91.99%	16,735	15,490	92.56%	16,626	15,307	92.07%	16,528	15,287	92.49%
2008	16,407	15,177	92.50%	16,885	15,677	92.85%	16,571	15,506	93.57%	16,815	15,753	93.68%
2009	16,942	15,799	93.25%	16,443	15,396	93.63%	16,791	15,702	93.51%	16,537	15,553	94.05%
2010	16,375	15,331	93.62%	16,930	15,795	93.30%	17,057	15,975	93.66%	16,514	15,584	94.37%
2011	16,494	15,248	92.45%	16,312	15,179	93.05%	16,434	15,258	92.84%	16,932	15,827	93.47%
2012	16,139	14,970	92.76%	16,541	15,353	92.82%	16,439	15,121	91.98%	16,150	15,083	93.39%
2013	16,290	15,007	92.12%	16,664	15,234	91.42%	16,344	15,117	92.49%	16,335	15,105	92.47%

Appendix C. Actual Number of Basic CPS's that Link to March Basics by MIS, continued

March Basic Year	February																	
	MIS 1			MIS 2			MIS 3			MIS 5			MIS6			MIS 7		
	In Basic	Link to March	Percent	In Basic	Link to March	Percent	In Basic	Link to March	Percent	In Basic	Link to March	Percent	In Basic	Link to March	Percent	In Basic	Link to March	Percent
1989	17,102	15,913	93.05%	17,488	16,287	93.13%	17,712	16,574	93.57%	17,033	15,379	90.29%	16,849	15,542	92.24%	17,758	16,358	92.12%
1990	18,363	17,082	93.02%	18,374	17,156	93.37%	19,021	17,798	93.57%	18,238	16,690	91.51%	18,681	17,200	92.07%	18,730	17,133	91.47%
1991	18,344	17,132	93.39%	18,834	17,532	93.09%	18,157	16,813	92.60%	18,599	17,066	91.76%	18,715	17,125	91.50%	19,177	17,623	91.90%
1992	17,751	16,618	93.62%	17,873	16,761	93.78%	18,590	17,297	93.04%	18,538	17,009	91.75%	18,903	17,310	91.57%	18,258	16,836	92.21%
1993	18,076	17,053	94.34%	18,445	17,419	94.44%	18,326	17,184	93.77%	17,692	16,427	92.85%	17,723	16,506	93.13%	18,492	17,239	93.22%
1994	16,653	15,878	95.35%	17,417	16,617	95.41%	18,013	17,103	94.95%	17,806	16,879	94.79%	17,711	16,882	95.32%	17,907	17,134	95.68%
1995	17,236	16,345	94.83%	17,804	16,988	95.42%	17,682	16,812	95.08%	16,584	15,858	95.62%	17,286	16,421	95.00%	17,704	16,997	96.01%
1996	15,065	14,408	95.64%	14,915	14,168	94.99%	15,559	14,779	94.99%	14,765	14,159	95.90%	14,910	14,320	96.04%	14,871	14,336	96.40%
1997	14,828	14,288	96.36%	15,262	14,596	95.64%	15,483	14,799	95.58%	14,744	14,209	96.37%	14,786	14,181	95.91%	15,342	14,794	96.43%
1998	14,859	14,224	95.73%	15,195	14,475	95.26%	15,717	15,057	95.80%	14,725	14,066	95.52%	14,750	14,194	96.23%	15,175	14,513	95.64%
1999	14,598	13,887	95.13%	15,358	14,598	95.05%	15,497	14,815	95.60%	14,755	14,124	95.72%	14,808	14,127	95.40%	15,410	14,780	95.91%
2000	14,522	13,789	94.95%	15,199	14,482	95.28%	14,946	14,253	95.36%	14,931	14,215	95.20%	15,335	14,591	95.15%	15,724	15,034	95.61%
2001	14,490	13,775	95.07%	14,249	13,494	94.70%	14,829	14,123	95.24%	14,498	13,768	94.96%	15,001	14,269	95.12%	14,893	14,326	96.19%
2002	17,258	16,411	95.09%	17,858	17,071	95.59%	17,635	16,850	95.55%	17,137	16,379	95.58%	17,161	16,437	95.78%	17,892	17,213	96.21%
2003	17,587	16,737	95.17%	17,522	16,695	95.28%	18,467	17,613	95.38%	17,255	16,519	95.73%	17,464	16,798	96.19%	17,627	16,997	96.43%
2004	16,874	16,043	95.08%	17,148	16,345	95.32%	17,497	16,709	95.50%	17,871	16,913	94.64%	17,289	16,485	95.35%	18,282	17,471	95.56%
2005	16,426	15,488	94.29%	17,147	16,174	94.33%	16,914	16,022	94.73%	17,240	16,297	94.53%	17,680	16,751	94.75%	17,803	17,100	96.05%
2006	16,874	16,020	94.94%	17,127	16,276	95.03%	17,149	16,309	95.10%	16,669	15,669	94.00%	17,183	16,224	94.42%	16,880	16,220	96.09%
2007	16,406	15,540	94.72%	17,091	16,110	94.26%	16,711	15,907	95.19%	16,474	15,374	93.32%	16,843	15,954	94.72%	16,657	15,847	95.14%
2008	16,050	15,262	95.09%	16,777	15,898	94.76%	16,923	16,131	95.32%	16,425	15,564	94.76%	16,991	16,244	95.60%	16,923	16,238	95.95%
2009	16,537	15,740	95.18%	17,623	16,755	95.07%	16,612	15,872	95.55%	16,309	15,617	95.76%	16,961	16,245	95.78%	16,671	16,049	96.27%
2010	16,535	15,725	95.10%	16,906	16,128	95.40%	17,251	16,415	95.15%	16,780	15,991	95.30%	17,468	16,658	95.36%	16,689	16,033	96.07%
2011	16,367	15,498	94.69%	16,797	15,890	94.60%	16,436	15,600	94.91%	16,095	15,216	94.54%	16,694	15,917	95.35%	16,922	16,172	95.57%
2012	16,265	15,348	94.36%	16,749	15,866	94.73%	16,696	15,842	94.89%	16,092	15,278	94.94%	16,679	15,773	94.57%	16,233	15,474	95.32%
2013	16,072	15,133	94.16%	16,643	15,729	94.51%	16,493	15,569	94.40%	15,983	15,214	95.19%	16,530	15,693	94.94%	16,217	15,474	95.42%

Appendix C. Actual Number of Basic CPS's that Link to March Basics by MIS, continued

March Basic Year	March							
	MIS 1	MIS 2	MIS 3	MIS 4	MIS 5	MIS 6	MIS 7	MIS 8
1989	16,932	17,192	17,279	17,449	17,328	16,966	16,738	17,500
1990	18,741	18,622	18,405	19,058	18,294	18,389	18,629	18,592
1991	18,157	18,461	18,538	18,055	18,700	18,700	18,577	19,040
1992	18,073	17,941	17,730	18,303	17,980	18,487	18,759	18,082
1993	18,048	18,340	18,330	18,118	18,036	17,809	17,637	18,300
1994	17,305	17,042	17,361	17,703	17,955	17,853	17,650	17,756
1995	17,174	17,457	17,556	17,303	17,061	16,726	17,072	17,572
1996	14,893	15,469	14,823	15,337	14,729	15,049	15,009	14,874
1997	15,237	15,237	15,147	15,319	14,869	15,059	14,805	15,316
1998	14,844	15,247	15,120	15,626	14,966	14,900	14,759	15,045
1999	15,169	15,002	15,243	15,444	14,612	14,996	14,837	15,473
2000	14,720	14,882	15,196	14,884	15,417	15,121	15,264	15,710
2001	14,398	14,656	14,108	14,683	14,491	14,578	14,842	14,907
2002	17,027	17,641	17,743	17,530	17,337	17,325	17,115	17,942
2003	17,715	17,929	17,450	18,210	17,400	17,443	17,480	17,661
2004	16,449	17,078	17,026	17,342	17,557	17,845	17,009	18,044
2005	16,484	16,703	16,948	16,699	16,804	17,315	17,540	17,822
2006	16,887	17,111	17,045	16,966	16,560	16,638	16,912	16,909
2007	16,588	16,814	16,970	16,803	16,725	16,510	16,767	16,640
2008	16,516	16,326	16,658	16,687	16,757	16,480	16,898	16,833
2009	17,098	16,810	17,444	16,532	16,687	16,453	16,908	16,718
2010	16,648	16,805	16,828	17,040	17,189	16,861	17,375	16,732
2011	16,698	16,613	16,647	16,252	16,462	16,178	16,519	16,906
2012	16,568	16,284	16,514	16,547	16,570	16,271	16,443	16,175
2013	16,270	16,357	16,558	16,365	16,095	16,266	16,421	16,202

Appendix C. Actual Number of Basic CPS's that Link to March Basics by MIS, continued

March Basic Year	April																	
	MIS 2			MIS 3			MIS 4			MIS 6			MIS 7			MIS 8		
	In Basic	Link to March	Percent	In Basic	Link to March	Percent	In Basic	Link to March	Percent	In Basic	Link to March	Percent	In Basic	Link to March	Percent	In Basic	Link to March	Percent
1989	17,418	15,915	91.37%	17,248	16,142	93.59%	17,432	16,303	93.52%	17,757	15,886	89.46%	17,226	15,673	90.98%	16,965	15,555	91.69%
1990	19,065	17,517	91.88%	18,847	17,587	93.31%	18,423	17,173	93.22%	18,593	16,755	90.11%	18,574	17,046	91.77%	18,747	17,237	91.95%
1991	18,459	16,880	91.45%	18,481	17,285	93.53%	18,556	17,476	94.18%	19,000	17,172	90.38%	18,768	17,248	91.90%	18,531	17,051	92.01%
1992	18,310	16,808	91.80%	17,852	16,709	93.60%	17,494	16,412	93.82%	18,257	16,397	89.81%	18,577	16,992	91.47%	18,719	17,058	91.13%
1993	18,509	16,880	91.20%	18,321	17,124	93.47%	18,082	17,002	94.03%	18,301	16,617	90.80%	17,786	16,374	92.06%	17,526	16,281	92.90%
1994	17,750	16,557	93.28%	17,146	16,369	95.47%	17,431	16,598	95.22%	18,239	17,239	94.52%	17,927	17,097	95.37%	17,808	17,021	95.58%
1995	17,707	16,551	93.47%	17,441	16,710	95.81%	17,624	16,886	95.81%	17,488	16,432	93.96%	16,904	16,081	95.13%	17,185	16,468	95.83%
1996	15,354	14,371	93.60%	15,525	14,944	96.26%	14,958	14,295	95.57%	15,165	14,269	94.09%	15,194	14,472	95.25%	15,100	14,533	96.25%
1997	15,655	14,739	94.15%	15,337	14,718	95.96%	15,135	14,584	96.36%	15,239	14,413	94.58%	15,161	14,589	96.23%	14,905	14,343	96.23%
1998	15,325	14,271	93.12%	15,316	14,580	95.19%	15,141	14,525	95.93%	15,212	14,288	93.93%	15,102	14,386	95.26%	14,838	14,293	96.33%
1999	15,536	14,444	92.97%	15,038	14,284	94.99%	15,325	14,594	95.23%	14,865	13,901	93.51%	15,156	14,370	94.81%	14,933	14,243	95.38%
2000	15,023	14,006	93.23%	15,043	14,282	94.94%	15,285	14,626	95.69%	15,798	14,905	94.35%	15,356	14,654	95.43%	15,466	14,773	95.52%
2001	17,761	13,735	77.33%	17,390	13,983	80.41%	16,981	13,545	79.77%	17,525	13,827	78.90%	17,517	14,006	79.96%	17,812	14,263	80.08%
2002	17,796	16,365	91.96%	17,878	16,954	94.83%	17,903	17,179	95.96%	17,809	16,646	93.47%	17,502	16,689	95.35%	17,270	16,561	95.89%
2003	18,202	17,063	93.74%	18,187	17,361	95.46%	17,604	16,884	95.91%	17,768	16,861	94.90%	17,615	16,881	95.83%	17,660	16,997	96.25%
2004	17,087	15,799	92.46%	17,276	16,351	94.65%	17,130	16,290	95.10%	18,009	16,789	93.23%	18,082	17,167	94.94%	17,210	16,402	95.31%
2005	17,158	15,795	92.06%	17,005	15,931	93.68%	17,196	16,259	94.55%	17,412	16,057	92.22%	17,518	16,524	94.33%	17,674	16,831	95.23%
2006	17,392	16,200	93.15%	17,228	16,365	94.99%	17,204	16,431	95.51%	16,978	15,808	93.11%	16,777	15,919	94.89%	17,214	16,329	94.86%
2007	17,163	15,979	93.10%	16,979	16,112	94.89%	17,234	16,369	94.98%	17,296	16,116	93.18%	16,823	15,867	94.32%	17,097	16,234	94.95%
2008	16,950	15,783	93.12%	16,515	15,737	95.29%	16,916	16,083	95.08%	17,144	16,181	94.38%	16,684	15,883	95.20%	17,069	16,363	95.86%
2009	17,667	16,466	93.20%	17,048	16,161	94.80%	17,707	16,827	95.03%	17,114	16,053	93.80%	16,572	15,839	95.58%	17,084	16,362	95.77%
2010	17,228	16,022	93.00%	17,000	16,060	94.47%	16,999	16,202	95.31%	17,709	16,493	93.13%	17,059	16,193	94.92%	17,684	16,812	95.07%
2011	17,139	16,014	93.44%	16,790	15,946	94.97%	16,803	15,972	95.05%	16,775	15,740	93.83%	16,382	15,544	94.88%	16,797	15,946	94.93%
2012	16,974	15,909	93.73%	16,362	15,539	94.97%	16,641	15,843	95.20%	16,876	15,850	93.92%	16,320	15,611	95.66%	16,756	15,892	94.84%
2013	16,898	15,584	92.22%	16,525	15,597	94.38%	16,609	15,817	95.23%	16,622	15,425	92.80%	16,413	15,644	95.31%	16,642	15,860	95.30%

Appendix C. Actual Number of Basic CPS's that Link to March Basics by MIS, continued

March Basic Year	May											
	MIS 3			MIS 4			MIS 7			MIS 8		
	In Basic	Link to March	Percent	In Basic	Link to March	Percent	In Basic	Link to March	Percent	In Basic	Link to March	Percent
1989	17,303	15,484	89.49%	17,176	15,592	90.78%	17,745	15,565	87.71%	17,190	15,287	88.93%
1990	19,031	17,150	90.12%	18,787	17,152	91.30%	18,629	16,412	88.10%	18,557	16,566	89.27%
1991	18,342	16,364	89.22%	18,484	16,897	91.41%	18,979	16,707	88.03%	18,608	16,724	89.88%
1992	18,361	16,410	89.37%	17,871	16,286	91.13%	18,416	16,143	87.66%	18,576	16,749	90.16%
1993	18,402	16,404	89.14%	18,241	16,733	91.73%	18,276	16,227	88.79%	17,664	15,920	90.13%
1994	17,790	16,145	90.75%	17,024	15,974	93.83%	18,259	16,877	92.43%	17,797	16,625	93.41%
1995	17,751	16,203	91.28%	17,474	16,399	93.85%	17,425	16,050	92.11%	17,070	15,862	92.92%
1996	15,261	13,875	90.92%	15,288	14,439	94.45%	15,114	13,830	91.50%	15,157	14,101	93.03%
1997	15,658	14,350	91.65%	15,250	14,298	93.76%	15,287	14,042	91.86%	15,295	14,300	93.49%
1998	15,411	13,975	90.68%	15,396	14,305	92.91%	15,382	14,021	91.15%	15,235	14,127	92.73%
1999	15,598	14,171	90.85%	15,080	13,981	92.71%	14,928	13,612	91.18%	15,160	14,060	92.74%
2000	15,076	13,704	90.90%	14,979	13,974	93.29%	15,721	14,519	92.35%	15,410	14,359	93.18%
2001	14,878	13,453	90.42%	14,711	13,747	93.45%	14,778	13,557	91.74%	14,846	13,760	92.68%
2002	17,868	15,920	89.10%	17,850	16,550	92.72%	17,738	16,168	91.15%	17,590	16,363	93.02%
2003	18,339	16,667	90.88%	18,173	16,888	92.93%	17,778	16,417	92.34%	17,688	16,557	93.61%
2004	17,174	15,389	89.61%	17,239	15,947	92.51%	18,070	16,406	90.79%	18,074	16,754	92.70%
2005	17,240	15,382	89.22%	17,142	15,673	91.43%	17,472	15,716	89.95%	17,604	16,218	92.13%
2006	17,350	15,664	90.28%	17,180	15,895	92.52%	16,949	15,347	90.55%	16,809	15,563	92.59%
2007	17,280	15,585	90.19%	17,048	15,778	92.55%	17,422	15,766	90.49%	16,931	15,629	92.31%
2008	17,059	15,413	90.35%	16,440	15,257	92.80%	17,268	15,830	91.67%	16,636	15,475	93.02%
2009	17,821	16,167	90.72%	17,022	15,764	92.61%	17,197	15,708	91.34%	16,733	15,546	92.91%
2010	17,191	15,565	90.54%	16,864	15,611	92.57%	17,595	16,084	91.41%	17,041	15,865	93.10%
2011	17,202	15,711	91.33%	16,826	15,682	93.20%	16,763	15,454	92.19%	16,495	15,343	93.02%
2012	16,904	15,428	91.27%	16,398	15,149	92.38%	16,887	15,480	91.67%	16,428	15,352	93.45%
2013	16,970	15,172	89.40%	16,506	15,214	92.17%	16,648	15,046	90.38%	16,556	15,437	93.24%

Appendix C. Actual Number of Basic CPS's that Link to March Basics by MIS, cont'd

March Basic Year	June					
	MIS 4			MIS 8		
	In Basic	Link to March	Percent	In Basic	Link to March	Percent
1989	17,109	14,949	87.38%	17,602	15,127	85.94%
1990	18,662	16,314	87.42%	18,398	15,775	85.74%
1991	18,250	15,879	87.01%	18,750	16,140	86.08%
1992	18,106	15,899	87.81%	18,302	15,565	85.05%
1993	18,257	15,904	87.11%	18,090	15,860	87.67%
1994	17,609	15,637	88.80%	18,014	16,343	90.72%
1995	17,548	--- ^b	--- ^b	17,329	--- ^b	--- ^b
1996	15,160	13,486	88.96%	15,158	13,602	89.73%
1997	15,616	14,049	89.97%	15,335	13,754	89.69%
1998	15,309	13,669	89.29%	15,355	13,779	89.74%
1999	15,551	13,863	89.15%	15,026	13,408	89.23%
2000	14,933	13,248	88.72%	15,780	14,226	90.15%
2001	17,653	12,979	73.52%	17,464	13,178	75.46%
2002	17,859	15,566	87.16%	17,758	15,924	89.67%
2003	18,209	16,301	89.52%	17,684	16,026	90.62%
2004	17,084	14,923	87.35%	18,087	16,116	89.10%
2005	17,271	14,993	86.81%	17,573	15,321	87.18%
2006	17,303	15,191	87.79%	16,982	15,038	88.55%
2007	17,241	15,180	88.05%	17,352	15,357	88.50%
2008	16,998	15,021	88.37%	17,250	15,500	89.86%
2009	17,745	15,792	88.99%	17,271	15,435	89.37%
2010	17,049	15,130	88.74%	17,579	15,764	89.68%
2011	16,974	15,138	89.18%	16,689	15,002	89.89%
2012	16,933	15,040	88.82%	16,941	15,258	90.07%
2013	16,762	14,662	87.47%	16,548	14,697	88.81%

^b: Respondents in June, July and August 1995 are only linkable to each other. See User Note 1 (1994) for more information